bar is attached to the fire-grate, so that when the fire-grate is down near the hearth, the lever is in action, keeping the descending bar at such a height, that the rack on the said bar is disengaged from the pinion, but when the fire-grate is wound up to a certain height, by turning the key, the horizontal arm of the ascending bar before-mentioned, reaches the loaded end of the lever, and in its ascent lifts up the said loaded end, suffers the descending bar to descend, and thus brings its rack into action with the pinion. A small bolt may be introduced, to carry the weight of the blower and its descending bar; by moving which bolt, the fire-grate alone, when this may be desirable, may be made to rise or fall without the blower being brought into action.

I have said nothing of fixtures or supports, in describing the beforementioned apparatus, because they are precisely similar to what would be employed in any other machinery, to connect and support parts similar to those which I have described, as exemplifying the means that may be used to give an ascending or descending motion to the fire-grate, or fire-grate and blower, of my improved stove grate. Which improved stove-grate I mean to distinguish, on account of its property of suffering the fire-grate to be raised and lowered, by the name of "The Patent Metastatic Stove Grate."

On the Potash extracted from the Fruit of the Æsculus Hyppocastanum, (the Horse Chesnut Tree,); by M. D'Arcet.

[*From the Annales de Chimie,*]

Such great progress has been made in France, in the art of extracting soda from sea salt, and so much is it extended, that our soda works, although established only a few years, could, if needful, furnish, at least, ten times the quantity that our manufactures consume; at the same time, as they are not taxed by government, the soda which they furnish bears such a moderate price in commerce, that the benefits of this valuable branch of trade is secured to the country. In this respect, therefore, we have nothing to desire; but there are still many instances in which soda cannot always be substituted for potash; consequently it is of importance, that all possible means be employed to fabricate in France the quantity of potash that is indispensable for our works of saltpetre, alum, soap, colours, crystals, glass, &c.

We know, that all burnt vegetables leave a saline earthy residuum, of which potash constantly makes a part.* It is from this abundant source, as well as from the sulphate produced from the muriate of potash and the lees of wine, &c., that this alkali must be extracted; but it must first be carefully ascertained what quantity of potash each species of plant, tree, or shrub, will furnish, and certainly a complete work of this kind, well executed, would furnish a multitude of facts, of great importance to the arts and sciences.

Chemists, who have hitherto been occupied in researches of this nature, have generally confounded the free or carbonated alkali with the divers soluble salts contained in the ashes of the plants, and have given the name of potash to this

* We find a considerable quantity of potash in the soda produced from sea-weed, and the different species of marine plants that are collected on the sea shore, and especially in the richest sodas that are produced by the incineration of salsola, and by the pasty infusion of the ashes of this species of plant: the soda extracted from sea-salt has the advantage of containing much less.

saline mixture. Whence it follows, that their works are not so generally useful to the arts, as if they had been careful to indicate the proportion of alkali contained in each mixture; an omission which is the more to be regretted, as we know what labour and perseverance it has required to arrive at the numerous results contained in the tables that have been published on this subject by Messrs. Kirwan, Pertuis, Redi, Saussure the son, Vanquelin, and Trousson, &c.

Having occasion, in October last, to provide myself with a considerable quantity of horse-chesnuts, I endeavoured to determine with accuracy the quantity of potash that could be extracted from them in the large way, and it is the result of this trial that I now make public.

First Experiment.

I began by burning upon a grate, with a cast iron chimney, of Desarnod's construction, a considerable quantity of chesnuts, pretty ripe, but still partly adhering to their husks. I obtained 1,180 kilogrammes of ashes, from 100 kilogrammes of chesnuts.

One hundred grammes of these ashes were washed with care, and the solution neutralised by adding to it, by little and little, concentrated sulphuric acid, diluted by the addition of 0,9 of water.* 35,8 Grammes of weak sulphuric acid was employed to saturate the solution, which makes 35,8 grammes of sulphuric acid, to 1,844 of specific weight, or 35,8 degrees.

Second Experiment.

The ashes obtained by burning the fruit alone, and without being dried, but only a little withered, furnished a lessive, which took 39,78 grammes of diluted sulphuric acid to saturate it, which gives the quality of these ashes at 39,78 degrees. The insoluble residuum in water weighed 39,35 grammes.

Third Experiment.

The withered husks were burnt separately, and the ashes essayed by the ordinary process, gave 33,2 degrees. There remained in the water 0,54 of the insoluble residuum.

Fourth Experiment.

I put in a dry place a large sack-full of chesnuts, that were gathered in their husks in October, 1810. The 1st of July, 1811, the whole being well dried, I burnt 28 kilogrammes; I obtained 976 grammes of ashes, which make 3,485 to the 100.

100 Grammes of these ashes gave 30,4 degrees, and 51,2 grammes of residuum insoluble in water.

600 Grammes of the same ashes, carefully washed, gave of

	GR.
Insoluble residuum in the water, ...	311,4*
Calcined salts, ...	299,8

100 Grammes of this saline mixtere, calcined, which was perfectly white, and similar in appearance to

* The strength of the acid is regulated in the following manner, invented by M. Decroizilles: it is poured out of a graduated tube, (which he calls a kalimeter,) containing thirty-eight grammes of the diluted acid, and is divided so as to show, on inspection, how many half grammes have been employed in the saturation. Each half gramme of the diluted acid contains a quantity of real acid, equal to 1,100th of the quantity of alkali. Annales de Chimie, tom. LX. This alkalimeter has been within the last four years generally used as a standard for soda.

* The augmentation of 11,2 grammes, which appears in these products, should be in part attributed to the carbonic acid absorbed in the washing, the evaporation of the lessive, and the calcination of the salt; but especially to a certain quantity of water, that the salt which is in lumps retains with much more facility than the unwashed ashes which are in a fine powder.

the finest potash of commerce, essayed by the ordinary process, gave 65 degrees, which is equal in richness to the best American pearl-ash.

Observations.

By comparing the second and third experiments, we see that the ashes of the chesnut are richer in alkali than the ashes of the husk that incloses it, and which separates from the fruit as it ripens.

The experiments, first, second, and third, compared with the fourth, furnish another proof of the advantage obtained by effecting the combustion of plants before their dessication, and in a little time after they are ripe. Lastly, we see, by the details of the fourth experiment, that 100 kilogrammes of the fruit, with its skin, well dried in the air, give by combustion 3,485 kilogrammes of ashes, from which are easily extracted 1,741 kilogrammes of potash, at 65 degrees.

If we consider, however, that the caloric disengaged during the combustion of plants may be rendered useful in washing the ashes, and evaporating the lessives, we shall perceive all the advantages that would arise from an undertaking on a large scale in this branch of industry. I do not mean only in burning the fruit of the horse-chesnut tree, but likewise in burning (which has been often proposed,) the great number of plants that cover the soil of forests, the borders of high-roads uncultivated grounds, &c.

It is the more desirable to introduce this branch of industry into the interior of France, as the price of foreign potashes is augmenting whilst their richness in alkali diminishes.*

Some years ago it was easy to meet with potash saturated with concentrated sulphuric acid from 0,63 to 0 64. This at least has been demonstrated to me by the numerous trials of potash that I have had occasion to make in the last five years.

I think that the best method of hastening the time when we may supply ourselves with as much potash as we require, would be to determine with care the quality of the ashes produced from each species of vegetable, in order that we may easily compare their true value with that of the potash of commerce, and thus arrive at the knowledge of the plants that are preferable for this purpose, and of those that during a maritime war may be cultivated on a large scale with advantage.

I shall here subjoin the results of some trials of this nature. I do not give the relative quality of each species of ashes, because the quality produced from a given weight of each plant is already stated in several printed works. The following are the means of several trials that were each made with 100 grammes:

	GR.
Ashes of peeled wood, burnt in a large reverberating furnace - - - - - - - - - - -	10,40
——— wood charcoal burnt in a coppell furnace - - -	11,6
——— new wood burnt in an ordinary chimney - - -	8,19
——— float wood burnt in the same chimney - - - -	4,35
——— fern - - - - - - - - -	1.85
——— prepared tobacco still humid - - - - - - - - -	2,85

* The French manifest much ingenuity in discovering substitutes for articles in their manufactures, when they are deprived of the regular supply by the accidents of war. We might usefully imitate them. The subject is deserving of much attention in our present relations with the United States. B.M.M.

Ashes of burnt turf - - -	not an atom of alkali.
——— red tartar burnt - - -	17,8
——— white tartar burnt - -	20,35
——— cream of tartar - - -	25.
The black flux, which is a mixture of two parts of tartar and one of nitrate of potash	51.
The white flux, which is a mixture of equal parts of tartar and nitrate of potash	60.

We see by these trials that the ashes of wood are richer in alkali than has been imagined; that those of turf are poorer. The two last trials furnish a method of making the white and black flux at a low price, by substituting for the tartar and nitrate of potash subcarbonate of potash and charcoal powder, and intimately mixing these matters in the proportions indicated by the above table.

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